

## I. ESTIMATED EMISSION REDUCTIONS

The first step in estimating potential emission reductions achieved by the contingency measure is estimating the number of devices subject to Ordinance 354. For purposes of developing the SIP, CARB staff estimated that before the start of the Program, 711 uncertified wood stoves or wood inserts and 139 fireplaces were used as the primary sources of heat in homes in the Nonattainment Area. The goal of the Program is to reduce PM<sub>2.5</sub> emissions by replacing these devices with cleaner burning and more efficient home heaters. The Program is being phase in over five years (2016-2020) and when it reaches full maturity, by the end of 2020, it is expected to reduce PM<sub>2.5</sub> emissions by 0.077 tons per day (tpd).

By December 31, 2018, 281 devices (269 stoves and 12 fireplaces) were replaced in the Nonattainment Area. These change-outs are expected to reduce PM<sub>2.5</sub> emissions by 0.0465 tpd. More change-outs will have to be completed before PM<sub>2.5</sub> emissions reach levels necessary to attain. These additional change-outs will have to reduce PM<sub>2.5</sub> emissions an additional 0.0305 tpd (for a total of 0.077 tpd). CARB staff estimated that this level of reductions could be achieved by replacing 184 additional devices.<sup>1</sup> Table 1 lists factors considered in estimating PM<sub>2.5</sub> emission reductions associated with changing-out additional 184 stoves.

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<sup>1</sup> Staff assumed the following replacement devices: 60 stoves with emission rate of 2.8 g/hr; 119 stoves with emission rate of 2.0 g/hr and 5 non-wood devices with negligible PM<sub>2.5</sub> emissions.

Table 1. Estimating benefits associated with 184 additional change-outs needed for attainment.

Constants & Conversions	Value	Unit	Source
Old Device Emission Factor	30.60	lb/ton	AP-42, Table 1.10-1
Old Device Efficiency	54	%	AP-42, Table 1.10-5
New Device Efficiency	68	%	AP-42, Table 1.10-5
Wood Use	4.3	cord	District Survey
Wood Density	1.04	ton/cord	U.S. EPA Emission Calculator <sup>2</sup>
Average Burn Rate <sup>3</sup>	1.5	kg/hour	
Emission Rate Scaling Factor <sup>4</sup>	1.5		
Conversion from lb to ton	2000		
Conversion from g/kg to lb/ton	2		

New Device Type	Device Emission		Emissions (tons per year (tpy))			Number of Devices	Emission Reductions	
	Rate (g/hr)	Factor (lb/ton)	Before	After	Difference		tpy	tpd
Wood	2.8	5.6	0.0684	0.0099	0.0585	60	3.5087	0.0096
Wood	2.0	4.0	0.0684	0.0071	0.0613	119	7.2970	0.0200
Non-wood	0.00	0	0.0684	0.0000	0.0684	5	0.3421	0.0009
Total						184	11.1477	0.0305

From the 281 stoves and fireplaces replaced by the end of 2018 in the Nonattainment Area and the 184 additional replacements needed for attainment, these 465 changed-out devices will provide the emission reductions needed to attain the annual standard of 12  $\mu\text{g}/\text{m}^3$  by December 31, 2021. With these 465 devices changed-out in the Nonattainment Area, a remaining 258 uncertified stoves and 127 fireplaces are expected to continue to be used as a primary source of heat in homes in the Nonattainment Area. Based on the 2012 American Community Survey, an estimated 43 percent of Nonattainment Area households are located in the City of Portola (Table 2).<sup>5</sup> Therefore, we estimate that 43 percent of uncertified devices potentially remaining in operation after the attainment date will be located in the City of Portola and subject to Ordinance 354 (Table 3).

<sup>2</sup> <https://www.epa.gov/burnwise/wood-burning-air-quality-tools-guidance-documents-and-resources>.

<sup>3</sup> U.S. EPA Gary Blais Personal Communications.

<sup>4</sup> Staff assumed that real world emissions are 50 percent higher than test emissions.

<sup>5</sup> 2008-2012 American Community Survey 5-Year Estimate: [ [HYPERLINK "https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/2012/"](https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/2012/) ] Consistent with the SIP, a factor of 27% was used to scale households in Plumas County to the Nonattainment Area.



Table 2. Estimating percent of Nonattainment Area households residing in the City of Portola.

Category	Plumas County	Nonattainment Area	City of Portola
Households	9,109	2,458	1,055

Table 3. Estimated number of devices subject to Ordinance 354.

Location and Status	Uncertified Stoves	Fireplaces
<b>Nonattainment Area</b>		
Operating before Program	711	139
Replaced through December 31, 2018	269	12
Additional needed for attainment <sup>6</sup>	184	0
Remaining in operation after the attainment date	258	127
<b>City of Portola</b>		
Subject to Ordinance 354	110	54

U.S. EPA has generally recommended that the contingency measures for attainment demonstration should provide PM<sub>2.5</sub> emission reductions worth of one year's progress.<sup>7</sup> The Portola Plan estimated this amount to be 0.0085 tpd. The contingency provision of Ordinance 354 is estimated to reduce PM<sub>2.5</sub> emissions by 0.0044 tpd based on the following assumptions:

1. About 12 percent of days annually will be subject to the contingency provision of Ordinance 354. This was estimated by determining the average number of days with PM<sub>2.5</sub> concentrations between 20 µg/m<sup>3</sup> and 30 µg/m<sup>3</sup> during the extended wood burning season (September to April) based on data for 2013 through 2015.
2. The estimated 110 wood stoves and 54 fireplaces potentially remaining in operation as primary sources of heat in homes in the City of Portola (Table 3), will be subject to Ordinance 354.
3. Reducing PM<sub>2.5</sub> emissions from 110 wood stoves and 54 fireplaces by 12 percent yields annual emission reductions of 0.0044 tpd (Table 4).

<sup>6</sup> For simplicity staff assumed that all future change-outs will involve uncertified wood stoves or inserts.

<sup>7</sup> 72 Fed. Reg. 20,586, 20,643 (Apr. 25, 2007).

Table 4. Estimated emission reductions if contingency is triggered.

Category	Stoves	Fireplaces	Total
Emission Factor (lb. PM2.5/ton of wood)	30.6 <sup>8</sup>	34.6 <sup>9</sup>	
Wood use annual (cords) <sup>10</sup>	4.3	6	
Wood density (ton/cord) <sup>11</sup>	1.04	1.04	
Conversion from lb. to ton	2000	2000	
Number of Devices	110	54	164
Emissions (tpy)	7.5264	5.8294	13.3558
Emissions (tpd)	0.0206	0.0160	0.0366
12% Reduction (tpd)	0.0025	0.0019	0.0044

## II. EMISSION REDUCTIONS AFTER THE ATTAINMENT YEAR

As noted above, considering the general purpose of contingency measures and the absence of specific requirements for the level of emission reductions required, U.S. EPA has generally recommended identifying contingency measures equal to approximately one year's worth of emission reductions necessary to achieve RFP for the area.<sup>12</sup> However, in some cases U.S. EPA has considered smaller emission reductions as satisfactory. This has been the case particularly when the circumstances fit under U.S. EPA's long-standing recommendation that states should consider "the potential nature and extent of any attainment shortfall for the area" and that contingency measures "should represent a portion of the actual emissions reductions necessary to bring about attainment in the area."<sup>13</sup> This section identifies additional emission reductions that, when used in conjunction with the contingency measure emission reductions, will provide sufficient reductions to meet the recommended contingency level.

The implementation of the Program was scheduled to be phased in over a five year period, from 2016 through 2020. The emission reductions expected from

<sup>8</sup> AP-42, Table 1.10.-1, October 1996:

<https://www3.epa.gov/ttn/chief/ap42/ch01/final/c01s10.pdf>.

<sup>9</sup> AP-42, Table 1.9.-1, October 1996: <https://www3.epa.gov/ttn/chief/ap42/ch01/final/c01s09.pdf>

<sup>10</sup> District survey as outlined in the Portola Fine Particulate Matter (PM2.5) Attainment Plan, Appendix D: [http://myairdistrict.com/wp-content/uploads/2016/12/2017\\_sip.pdf](http://myairdistrict.com/wp-content/uploads/2016/12/2017_sip.pdf).

<sup>11</sup> U.S. EPA Emission Calculator: <https://www.epa.gov/burnwise/wood-burning-air-quality-tools-guidance-documents-and-resources>.

<sup>12</sup> 72 Fed. Reg. 20586, 20643 (Apr. 25, 2007).

<sup>13</sup> 78 Fed. Reg. 37741, 3770 (Jun. 24, 2013).

the implementation of the Program must be fully realized for an entire calendar year before they can be used for SIP purposes. Therefore, for demonstrating attainment of the standard, the emission reductions from a change-out are not allocated to the year in which a device was installed because change-outs are typically done mid-year, when heating is generally unnecessary. The reductions are allocated to the following year. This ensures air quality benefits for a full calendar year of the device operation for SIP purposes. For example, emission reductions associated with a new device installed in March of 2019 are not considered for SIP purposes in 2019, but are considered in modeling air quality starting from 2020 and going forward.

This phased implementation of the Program and the delay in applying emission reduction credit for completed change-outs were factored into calculating the attainment year design value. Consequently, each year in the 2021 modeled design value (2019, 2020, and 2021) reflected different emission reductions. Modeled air quality for 2019 reflected emission reductions of 0.045 tpd achieved from change-outs completed through December 31, 2018. Modeled air quality for 2020 reflected larger emission reductions of 0.065 tpd, achieved from change-outs completed through December 31, 2019. For 2021, modeled air quality reflected emission reductions of 0.077 tpd, achieved from the full implementation of the Program, change-outs completed through December 31, 2020. As a result, the 2021 modeled design value was estimated by factoring in only partial benefits of the Program.

As additional emission reductions reach maturity for SIP purposes, they are expected to provide reductions approaching recommended levels for contingency measures. In 2022, additional reductions are estimated to be 0.011 tpd. In 2023, as the Program benefits reach full maturity for SIP purposes, this will increase to 0.015 tpd. These additional emission reductions will continue into the future for the lifetimes of the devices. Table 5 summarizes additional emissions achieved in 2022 and 2023. Emission reductions are color coded with reductions achieved by the end of 2019, 2020, and 2021 appearing on black, gray, and white backgrounds, respectively.

Table 5. Additional emission reductions from the Program in 2022 and beyond not needed for attainment.

Year	Include Change-outs Completed through	Estimated PM2.5 Emission Reductions (tpd)		
		2021 3-Year	2022 3-Year	2023 3-Year
2019	12/31/2018	0.045		
2020	12/31/2019	0.065	0.065	
2021	12/31/2020	0.077	0.077	0.077

2022	12/31/2020		0.077	0.077
2023	12/31/2020			0.077
Average reductions (tpd)		0.062	0.073	0.077
Additional reductions (tpd)		0.000	0.011	0.015

A small amount of additional emission reductions would originate from California's Mobile Source Program (Mobile Program). Between 2021 and 2022, ongoing implementation of the Mobile Program will reduce PM2.5 emissions by 0.0001 tpd in the Nonattainment Area. The Nonattainment Area will also benefit from PM2.5 emission reductions due to the ban on open burning in the City of Portola. Non-agricultural open burning in the Nonattainment Area contributes 0.0001 tpd in PM2.5 emissions. Since Ordinance 354 prohibits open burning in the City of Portola, these emission should be reduced by about 43 percent, consistent with the percent of Nonattainment Area households located in the City of Portola. Table 6 summarizes emission reductions that demonstrate sufficient reductions for contingency purposes.

Table 6. Contingency measure and additional emission reductions.

Source of Reductions	2022 (tpd)	2023 and beyond (tpd)
Contingency Measure		
Ordinance 354	0.0044	0.0044
Additional Emission Reductions		
Full Benefit of Program	0.011	0.015
CARB Mobile Program	0.0001	0.0001
Prohibiting Open Burning	<0.0001	<0.0001
Total	0.0155	0.0195

Additional PM2.5 emission reductions expected to occur from the contingency provision of the mandatory wood burning curtailment, together with emission reductions due to the full implementation of the Program, along with ongoing State Mobile Program measures and the prohibition of open burning provide sufficient emission reductions for attainment contingency. As illustrated in Figure 3, emission reductions achieved from these efforts are about two times higher than the level recommended for contingency.

Figure 3. Compare the additional emission reductions to recommended contingency.

